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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/775,653	02/05/2001	Yuuichi Tachino	1076.1063 (JDH)	9294

21171 7590 10/16/2003

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EXAMINER

CROWELL, ANNA M

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 10/16/2003

14

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/775,653

Applicant(s)

TACHINO ET AL.

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 1,4-6,8,9,12,15,16,19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,3,7,10,11,13,14,17,18 and 21-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 2, 3, 7, 11, 13, 14, 18, and 23 rejected under 35 U.S.C. 102(b) as being anticipated by Tepman et al.

Referring to Figures 5 and 6, column 6, lines 15-24, and column 7, lines 35-65, Tepman et al. discloses a plasma reactor 30 which performs etching. The reactor 30 includes a dielectric reactor ceiling 240 (reaction tube), an RF coil unit 150 and 270 (high frequency coil antenna) with multiple windings 152, 154, and 156 (winding portions) in parallel with each other, and a connecting rod 310 (drive mechanism). The reactor ceiling 100 may be cylindrically shaped or other geometries suitable for plasma processing (col. 5, lines 65-67). The coil support 270 (intermediate segment which is sloped or inclined) is continuously formed between two of the plurality of winding portions 152, 154, and 156 in series, the sloped segment 270 is located closer outer peripheral surface of the reaction tube 240 than the plurality of winding portions 152, 154, and 156, and the sloped segment 270 is formed between a power supply terminal and a grounding terminal. The RF coil unit 150 and 270 is connected to ground at winding 152 and connected to a power supply source at 170. The RF coil unit 150 and 270 rotate around the reactor ceiling 100 by means of a connecting rod 310 (drive mechanism). When the RF coil is

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rotated around the reactor ceiling, the majority of the inner surface of the reactor vessel is cleaned (etched).

Regarding Claims 2 and 13

Claims 2 and 13 recite the limitation “when performing plasma etching”. This limitation refers to the intended use (etching) of the plasma apparatus which has no significance in the patentability of apparatus claims. A claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Thiabault, 164 USPQ 666, 667 (Bd. App. 1969).

3. Claims 10 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tepman et al. (U.S. 5,879,575) in view of Okumura et al. (U.S. 5,888,413).

The teachings of Tepman et al. have been discussed above.

Tepman et al. fails to teach a controller.

Referring to Figures 1 and 17, column 4, line 65-column 5, line5, and column 10, lines 5-10, Okumura et al. teaches that it is known to use a controller 100 to control the rotational speed of a coil 1 by controlling the stepping motor 3 (rotary actuator-drive mechanism). The coil 1 is connected to a stepping motor 3 via rotary shaft 4. By controlling the rotational speed of the coil, better control of the plasma density is achieved. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the rotational drive mechanism of Tepman et al. with the controller as taught by Okumura et al. This would provide better control of the plasma density inside the chamber.

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4. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tepman et al. (U.S. 5,879,575) in view of Takada et al. (U.S. 5,525,379).

The teachings of Tepman et al. have been discussed above.

Tepman et al. fails to teach the sloped segment wound around approximately one fourth the reaction tube and the winding wound around three fourths the reaction tube.

Referring to Figure 5a and column 5, lines 28-49, Takada et al. shows a plasma processing apparatus having a coil antenna 22 configuration including a sloped segment and two windings. The sloped segment is wound around approximately one fourth of a circumference of a peripheral surface of the reaction tube 21 and each winding is wound around approximately three-fourths of the circumference of the peripheral surface of the reaction tube since this is a preferable structure for generating an RF electric field (col. 5, lines 28-35). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the coil antenna of Tepman et al. with the coil antenna as shown by Takada et al. since this is a preferable structure for generating an RF electric field.

5. Claims 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raaijmakers et al. (U.S. 6,564,810) in view of Tepman et al. (U.S. 5,879,575).

Referring to Figures 1b, 2b, and 3b and column 4, line 36-column 5, line 38, Raaijmakers et al. discloses an inductively coupled plasma processing apparatus comprising a cylindrical reaction tube 35 made of a dielectric material (col. 4, line 45); an antenna 20 located around the reaction tube, the antenna including: a first winding connected to a power supply; a second winding connected at a ground; a capacitive coupling segment continuously formed between the

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first winding and the second winding wherein the capacitive coupling segment and the second winding form a coil (col.4, lines 55-59).

Raaijmakers et al. fail to teach a drive mechanism to move at least one of the antenna and the reaction tube to the other to perform plasma etching.

Referring to Figure 5 and column 7, lines 37-47, Tepman et al. teaches a plasma processing apparatus including a drive mechanism 310 that moves at least one of the antenna 150 and the reaction tube relative to the other so that the section of an inner surface of the reactor adjacent to the coil changes with time and therefore the majority of the inner surface of the reactor vessel is cleaned. (col. 7, lines 61-65). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a drive mechanism to move at least one of the antenna and the reaction tube as taught by Tepman et al. in the apparatus of Raaijmakers et al. in order to clean the majority of the reaction tube's inner surface.

Additionally, claims 24 and 26 recite the limitation "when performing plasma etching". This limitation refers to the intended use (etching) of the plasma apparatus which has no significance in the patentability of apparatus claims. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Thiabault, 164 USPQ 666, 667 (Bd. App. 1969).

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6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raaijmakers et al. (U.S. 6,564,810) in view of Tepman et al. (U.S. 5,879,575) as applied to claim 24 and 26 above, and further in view of Takada et al. (U.S. 5,525,379).

The teachings of Raaijmakers et al. in view of Tepman et al. have been discussed above.

Raaijmakers et al. in view of Tepman et al. fails to teach a segment is located closer to the tube than the first winding and the second winding.

Referring to Figure 5a, Takada et al. shows a plasma processing apparatus having an antenna coil 22 wherein a segment is located closer to the tube than the first winding and the second winding as a preferable structure for generating an RF electric field (col. 5, lines 28-35). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the antenna of Raaijmakers et al. in view of Tepman et al. with a segment located closer to the tube than the first winding and the second winding since it is a preferable structure for generating an RF electric field. Additionally, the configuration of the antenna is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed antenna was significant.

Response to Arguments

Applicant has argued that the capacitive coupling segment 33 is a part of the coil 23 yielding a single coil, and the RF coil 150 of Tepman et al. is mounted on a coil support 270 yielding separate members.

However, since the coil support 270 is connected to the RF coil 150, the coil support 270 is a part of RF coil 150 to create a coil unit. Furthermore, the use of a one piece construction instead of two piece construction would be merely a matter of obvious engineering choice.

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Applicant has argued that the capacitively coupling segment 33 is easily formed by deforming the coil 23.

Such limitation has not been claimed; therefore, the claims are given the broadest reasonable interpretation in light of the supporting disclosure.

Applicant has argued that the RF coil 150 of Tepman et al generates the plasma only by inductively coupling and does not include a portion corresponding to the capacitive coupling segment 33.

It is well known to one of ordinary skill in the art that initially an RF coil excites a gas to generate plasma inductively, however capacitive coupling will occur between the coil and the plasma generated.

Applicant has argued that Okumura et al. fails to teach a plasma etching apparatus having a coil antenna that is capacitively coupled to the reaction tube.

The teachings of Okumura et al. were applied to demonstrate using a controller to control the speed of an antenna. Moreover, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant has argued that Takada et al. provides power differently than in the claimed invention and fails to teach a plasma etching apparatus having a coil antenna that is capacitively coupled to the reaction tube.

Takada et al. was simply applied for the teachings of a sloped segment wound around

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approximately one fourth the reaction tube and the winding wound around three fourths the reaction tube. Moreover, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (703) 305-1956. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

AMC

October 10, 2003


GREGORY MILLS
SUPERVISORY PATENT EXAMINER
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